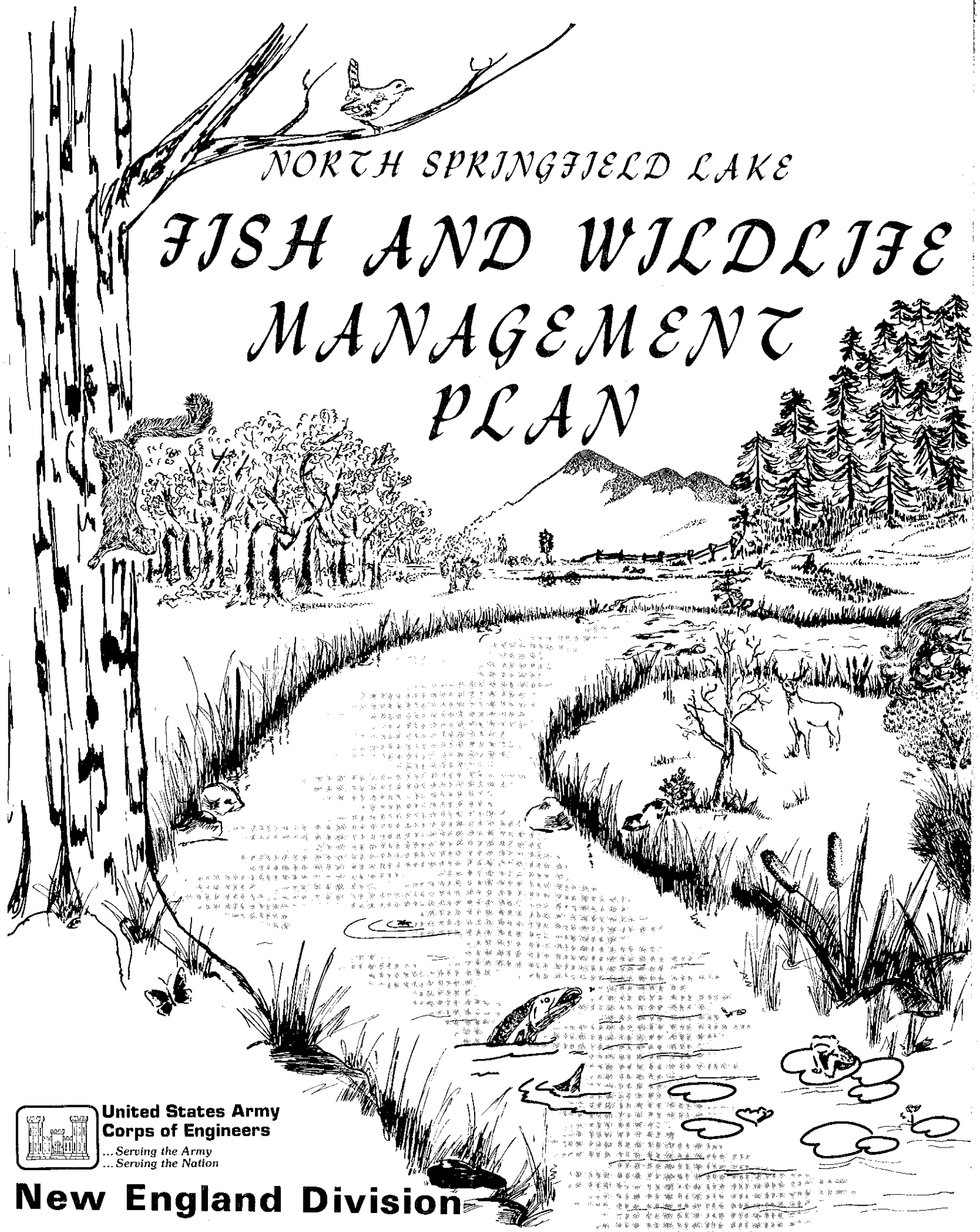

NORTH SPRINGFIELD LAKE

FISH AND WILDLIFE MANAGEMENT PLAN

United States Army
Corps of Engineers
...Serving the Army
...Serving the Nation

New England Division

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER

4. TITLE *(and Subtitle)*

North Springfield Lake
Fish and Wildlife Management Plan

5. TYPE OF REPORT & PERIOD COVERED

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR*(s)*

U.S. Army Corps of Engineers
New England Division

8. CONTRACT OR GRANT NUMBER*(s)*

9. PERFORMING ORGANIZATION NAME AND ADDRESS

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS

Dept. of Army, Corps of Engineers
New England Div., NEDOD
424 Trapelo Rd., Waltham, MA 02254

12. REPORT DATE

October 1980

13. NUMBER OF PAGES

36

14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*

15. SECURITY CLASS. *(of this report)*

Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for Public Release, Distribution Unlimited

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Lands, waters, fish, wildlife, habitat, management practices

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The objectives of this management plan is to outline management practices which are compatible with flood control operations and multiple-use practices at North Springfield Lake and to guide the sound ecological management of fish and wildlife resources.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

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REFERENCE OR OFFICE SYMBOL	SUBJECT
NEDOD-P	Master Plan, Appendix D - Fish and Wildlife Management Plan, North Springfield Lake, Vermont

TO	FROM	DATE	CMT 1
SEE DISTRIBUTION	Chief, Operations Division	5 November 1980 Mr. Mitchell/jb/305	

1. The subject appendix, prepared in accordance with ER 1130-2-400, dated 28 May 1971, has been approved by the Division Engineer.

2. The plan has been developed to increase the value of reservoir lands for recreation and wildlife, and to promote natural ecological conditions by following accepted conservation practices.

3. This plan has been developed in coordination with the Vermont Departments of Forests and Parks, Fish and Game, and Water Resources; U.S. Fish and Wildlife Service; U.S. Forest Service; and several private groups concerned with resource management of public lands.

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REFERENCE OR OFFICE SYMBOL	SUBJECT
NEDOD-P	Appendix D, Fish and Wildlife Management Plan, North Springfield Lake

TO	FROM	DATE	CMT 1
Division Engineer	Chief, Operations Division	22 October 1980 Mr. Mitchell/jb/305	

1. Inclosed for your approval is the Fish and Wildlife Management Plan for North Springfield Lake. This plan will serve as Appendix D to the Master Plan for this project.

2. It has been prepared in accordance with ER 1130-2-400, dated 28 May 1971. It has been reviewed by NED Planning and Engineering Divisions and the Vermont Department of Forests, Parks and Recreation. Appropriate changes have been incorporated. The blue line map will be reduced and will accompany the plan.

3. Division Engineers have been given approval authority for these plans by ER 1130-2-400. Information copies are to be forwarded to OCE upon approval.

ANDRELIUNAS

Incl
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CF: Opers Div Files

TO: Chief, Operations Division FROM: Division Engineer DATE: 23 OCT 1980 CMT 2

[X] APPROVED [ ] DISAPPROVED

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

☆ U.S. GPO: 1974—558-130/6656

NORTH SPRINGFIELD LAKE

SPRINGFIELD, VERMONT

FISH AND WILDLIFE MANAGEMENT PLAN

MASTER PLAN APPENDIX D

NEW ENGLAND DIVISION, CORPS OF ENGINEERS
OPERATIONS DIVISION
WALTHAM, MASSACHUSETTS
October 1980

ACKNOWLEDGEMENTS

The Corps of Engineers, New England Division, wishes to thank Roger Spaulding for his efforts in developing this natural resource management plan.

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SECTION 1. INTRODUCTION

Purpose

Lands and waters of the North Springfield flood control reservoir are a valuable asset to the surrounding areas, providing recreational opportunities and preserving natural areas in public ownership. It is important that these lands and waters be sensibly managed according to sound ecological principles to insure their existence for future generations and their continued productivity as fish and wildlife habitat.

The purpose of this plan is to describe the fish and wildlife habitat and populations within the project boundaries and to provide a framework to manage these resources.

Authority

This fish and wildlife management plan is an essential appendix to the project master plan authorized under ER 1130-2-400 dated 28 May 1971.

Management Objectives

The objective of this management plan is to outline management practices which are compatible with flood control operations and multiple-use practices at North Springfield Lake and to provide for the sound ecological management of fish and wildlife resources.

Specific objectives are to protect and enhance natural beauty, develop fish and wildlife habitat to support and attract the greatest variety and number of naturally occurring species, and to provide for diversified recreational use of project natural resources including hunting and fishing, nature observation and interpretation, and day use.

Coordination

This plan was coordinated with the Vermont Departments of Fish and Game, Water Resources, and Forests and Parks; the U.S. Fish and Wildlife Service, U.S. Forest Service and several private interests concerned with resource management of public lands and waters.

SECTION 2. PROJECT DESCRIPTION

Location

North Springfield Lake is located in east-central Vermont in Windsor County on the Black River, approximately 8.7 miles above the confluence with the Connecticut River. The lands and waters of the project are within the towns of Springfield and Weathersfield and adjacent to the Springfield State Airport. Access to the area is provided by Interstate 91 via Vermont 131 and 106.

Acquisition

The project was authorized under the Flood Control Act of 1938 (Public Law 761, 75th Congress, 3rd Session) as amended by the Flood Control Act of 1941 (Public Law 228, 77th Congress, 1st Session) and the Flood Control Act of 1944 (Public Law 534, 78th Congress, 2nd Session). Total area of the reservoir is 1792 acres, of which 1372 acres were purchased in fee and the remaining 420 acres are held in flowage easement. Acquisition took place from 1956 to 1959. Construction began in 1957 and was completed in 1960.

General

Of the 1372 acres owned in fee at North Springfield Lake, approximately 425 are wooded. The conservation pool at the main dam covers about 100 acres at elevation 467 feet MSL. The recreation pool at Stoughton Pond covers 65 acres at elevation 502 feet MSL. About 20 acres adjacent to the large pool is marshland. The remainder of fee-lands is open fields. Fee lands include areas up to the approximate elevation of 520 feet MSL. The spillway crest elevation is 545.5 feet MSL. Hydrologic studies indicate the reservoir would fill to this elevation once every 35 to 50 years. Flowage easements have been obtained to elevation 550 feet MSL.

History

In early times the Black River valley was a major route used by Abnaki, Pennacook, and Pocumtuck Indians. During the mid-18th century the trail was used by settlers and was the major route to Quebec. In 1759 a military road was constructed along this route between Old Fort No. 4 and Lake Champlain to connect with Fort Ticonderoga. This road became known as Crown Point Road. A short section passes through the reservoir in the area of Stoughton Pond with the site and original marker of the 10 Mile Camp found here.

In recent history reservoir land was mainly agricultural. The areas which are now open were pastures or fields. At the time of construction most merchantable timber was removed by the former landowners,

and four covered bridges located in the reservoir were either disassembled and stored or removed and relocated for preservation.

Topography

The Black River watershed drains in a generally southeasterly direction. It is about 22 miles long and 12 miles wide with a drainage area of 204 square miles, of which 158 are upstream of the North Springfield Dam. Elevations vary from 3700 feet MSL at the headwaters to 280 feet MSL at the confluence with the Connecticut River. There are a few ponds near the northern headwaters, but the watershed is generally conducive to rapid runoff.

The reservoir topography is generally steep, wooded hills with predominantly easterly and westerly exposures. A large amount of land in the bottom of the basin is gently rolling fields. Elevations within the reservoir range from about 1000 feet MSL at the top of the ridges to about 450 feet MSL at the dam.

Climate

The Black River Basin has a variable climate characterized by frequent short periods of heavy precipitation. Winds are predominantly from the west bringing occasional cyclonic disturbances that cross the county from the west or southwest, producing frequent weather changes. The area is also subjected to coastal storms, occasionally of tropical origin, that travel up the Atlantic seaboard.

Winters are moderately severe with sub-zero temperatures common. Summers are mild with temperatures over 90°F. The average annual temperature is 53°F. Throughout the year average monthly temperatures vary widely from 18°F in January to 68°F in July. Temperature extremes range from occasional highs slightly above 100°F to infrequent lows in the minus 40's. The average frost-free period is about 112 days.

Precipitation is evenly distributed throughout the year with the annual mean approximately 40 inches. The annual mean snowfall for the middle of the Black River Basin is 84.2 inches with about 50 percent occurring in January and February.

Maximum water content of snow occurs about the middle of March and averages about 6.5 inches with a maximum of 10.8 inches and a minimum of 3.7 inches. As a result of melting snow, springtime runoff is frequently moderately high, but has not been sufficient alone to cause a flood. A combination of heavy rain and snowmelt could, however, cause serious flooding.

Annual runoff averages 23.58 inches with a range of 10.29 inches in 1965 to 36.40 inches in 1960. The mean annual runoff represents about 60 percent of the mean annual precipitation. During the months of March, April and May about 60 percent of the mean annual runoff occurs. To date the recorded discharges of the Black River at the North Springfield gage (158 square miles of drainage area) have varied from a peak of 15,500 CFS in September 1938 to a minimum of 8 CFS in July 1962. The annual average is 274 CFS.

Geology and Soils

North Springfield underlying base-rock foundations are Palaeozoic in origin. Granitic gneiss outcrops occur near the dam. Surface geology in the basin is composed of varying thicknesses of glacial till. The terraces surrounding the permanent pool are predominantly Merrimac soils with Colrain and Woodstock soils occurring on some of the glacial till covered uplands. Ondawa and Agawam soils are found on the bottomlands along the river.

The Stoughton area has not been soil mapped. To the north and east of the pool Windsor sands are found. Podunk and Ondawa series are found on the bottomlands below the dam adjacent to the North Branch.

The upland soils (Merrimac, Colrain, and Woodstock) are generally well drained sandy loams with moderately rapid permeability and available moisture capacity varying from medium to moderately low. Natural fertility varies from medium to low.

Bottomland soils (Ondawa and Agawam) are well drained sandy loams with moderate to moderately rapid permeability. Agawam is low in both fertility and moisture capacity. Ondawa is medium for both.

SECTION 3. AQUATIC RESOURCES

General

Successful management of the aquatic based resources such as fish, aquatic furbearers, and waterfowl in the water resource project necessitates a complete understanding of the limnological charcteristics of the lake. This is so, because it is through this body that the nutrient and energy flow cycle must travel to all the organisms of the aquatic community. Personnel implementing this management plan must avail themselves of all data concerning these characteristics.

Stoughton Pond is considered a marginal trout lake. The conditions present permit the survival of stocked trout, but the potential for reproduction and growth are limited by siltation, borderline water temperatures, and competition from other species.

North Springfield Lake is not as deep as Stoughton Pond and is a warm water lake with extensive shallows in some areas. This lake is suitable for warm water fisheries.

Both the Black River and the North Branch of the Black River are cold water rivers with typical salmonid characteristics. The Black River has two old hydroelectric dams no longer in use located near Perkinsville. Both are within the reservoir bounds. These dams back up small pools, but there is no significant change in limnological characteristics of the river.

Warm Water Fishery

In November 1971 the Vermont Fish and Game Department stocked 7300 fingerling largemouth bass (Micropterus salmoides) averaging 2.7 inches total length in North Springfield Lake. This species was chosen because it is the most likely predator sport fish able to reproduce after the pool stabilizes from spring runoff and early summer storms.

Bass spawn predominantly in May and June during which time the pool is usually quite stable. Species such as pickerel (Esox niger) or pike (Esox lucius) spawn in early spring in flooded fields and marshes where their roe and offspring can be stranded if the pool is drawn down rapidly.

On 7-8 August 1973 the Fish and Game biologists returned to sample the surviving bass population and to inventory the concurrent fish populations. The sampling method used was one twenty-four hour trapnet set and two twenty-four hour 125 foot experimental gillnet (1/2" to 1-1/2" square mesh) sets. The results of that sample area summarized in Table 1.

Table 1 shows that fishing potential in 1973 was still poor --70.6 percent of the total weight sample was suckers and shiners. However, the three bass taken (all by gillnet) ranged from 10.8 to 11.8 inches total length (TL) and all were II+ age class with a condition factor (ratio of TL to weight) of 57 which is above the state average. This indicates the stocking release of 1971 was partially successful because the bass were II+ age class and it suggests that North Springfield has a potential to develop a good warm water fishery. The large number of suckers and shiners present in the sample is evidence of good forage fish.

In 1974 the Fish and Game biologists returned to the lake to sample the population by electrofishing. On 12 June and 5 September 1974 a john boat equipped with a 230V 3 phase AC generator was used to sample the population. A total of 62 class III+ largemouth bass were collected in 1.3 total hours of electrofishing during the June sample. Tables 2 and 3 summarize the June sample.

These data (Table 2) show a decrease in percent of total weight of suckers and shiners as compared to 1973 data. Bass show a large increase suggesting that the total biomass is moving more in balance with predators comprising a more sizable percentage. This is the natural tendency of a developing predator population in a formerly highly stocked forage fish population.

Table 3 summarizes the total largemouth bass sample taken 12 June 1974. The majority of these fish were taken in an isolated cove near the dam and adjacent to the airport. This cove is somewhat less turbid than the main lake.

These data (Table 3) show an excellent rate of growth and condition factor for the class III+ bass which are probably survivors of the 1971 stocking effort. The one class I+ was probably raised in the lake because sexually mature bass were present in 1973. The summer flood of 1973 occurred at the peak of the bass spawning season. This probably caused the failure to capture any class II+ fish.

A total of 66 largemouth bass were taken in 1.4 hours during the 5 September 1974 sample. Significantly, 91 percent were young of the year. Table 4 summarizes the September data. The September sample shows successful reproduction in the summer of 1974. The data on class III+ shows the adult population to be vigorous and growing. Again, no class II+ fish were captured. As stated above, this was probably a result of the 1973 flood.

In 1975 fish and game biologists made another survey of North Springfield Lake to determine the status of the largemouth bass. This survey was conducted by electrofishing with the same equipment as in 1974. Similar procedures were followed throughout. On 23 May 1975 a

total of 1.4 hours of electrofishing was done. Just as in 1974 all species were sampled during the first 30 minutes of electrofishing in the same area, whereas only largemouth bass were taken during the remaining time. A total of 52 bass were taken compared with 63 that were taken in 1974, but the 1975 bass were significantly heavier.

Table 5 compares 1974 and 1975 data. It summarizes data for all species. In addition to those species, two smallmouth bass (Micropterus dolomieui) and one fallfish (Semotilus corporalis) were captured during the period in which only largemouth bass were recorded.

Table 6 compares the average weight, length, and condition factors of largemouth bass taken in the bass-only samples during 1974 and 1975. The comparison in Table 6 shows clearly that the bass population as a whole is gaining weight. Further, Table 5 shows that shiners (a primary forage fish of largemouth bass) are drastically down in both numbers and percent of weight of total catch. The total weight of fish caught in 1974 and 1975 was 16.4 pounds. Clearly the biomass is shifting in favor of the predator sport fish. Scale samples indicate that the majority of largemouth bass sampled are of age IV+, which would be the age of any survivor of the 1971 stocking.

Electrofishing on 10 October 1975 showed that the bass had reproduced successfully again in 1975. A total of 58 bass were taken in 45 minutes of sampling, 54 were age group 0. They averaged 2.3 inches total length (range 1.7 - 2.7) and weighed an average of 2.5 grams.

The indications are that the introduction of largemouth bass to North Springfield Lake was a success and that the habitat is generally suitable. Growth rates and condition factors are above the state average indicating a potential for a fine warm water sport fishery.

A few smallmouth bass have been found in the slow moving stretches of the Black River at the head of the reservoir. There is probably a potential for light fishing pressure on this sport fish.

Cold Water Fishery

During the first few years following the impoundment of Stoughton Pond local anglers reported good brown trout (Salmo trutta) fishing in the pond. As the rough fish population built up, however, the fishery declined to the point where it is now relatively unfished.

Stocking records indicate that between 1961 and 1968 an average of 3902 brown trout per year in the 6-9 inch class were released in the pond. These fish were stocked primarily as a "put and take" effort.

In 1964 the major push to establish a self-sustaining population was made by releasing 10,000 browns in the 1-3 inch class. In 1969 a switch was made to the releasing of rainbow trout (Salmo gairdneri) three thousand, 6-9 inchers were released both in 1969 and 1970. The switch was accomplished as a result of the population and lake survey conducted by John Claussen, District Fisheries Biologist for Vermont Fish and Game Department, 19-23 August 1968. At that time the rough fish population was very high providing stiff competition to young trout previously stocked. The percentage of the total catch made up of brown trout was only 0.6 percent. It was determined that there was very little suitable spawning area for trout in the pond and that previous efforts of establishing a breeding population were unsuccessful. These findings dictated a switch to catchable size rainbows which are considered a more "fishable" species.

Table 7 gives a summary of the species sampled by trapnet and gillnet in August 1968.

In 1970, during the period of low-flows, the pond was poisoned by the Vermont Department of Fish and Game in an effort to reclaim it for sport fishing. Over 3,000 rainbows were initially restocked with 11,000 more in 1971, 2,000 in 1972, 8,000 in 1973, 6,000 in 1974 and 5,100 in 1975. All of the above were spring yearlings averaging 7-8 inches except the 4,000 fall yearlings stocked in 1971.

These high numbers of fish were placed to "over-stock" the pond to ensure good fishing opportunities in view of the lack of suitable spawning area and the inevitable influx of rough fish from the rest of the uncontrolled drainage basin. To maintain an adequate fishery, Stoughton requires about 3,000 - 4,000 spring yearling rainbows annually.

Because of the lack of drawdown facilities at Stoughton, no future plans exist for reclamation. It is expensive to poison the whole pond when the rest of the drainage basin harbors the same undesirable species which would reinfest the pond.

A brown trout fishery exists in the Black River near the old Perkinsville Power Dam from the dam to the confluence with the North Branch. It appears to be self-sustaining.

Brook trout (Salvelinus fontinalis) reproduce well in the headwaters of the North Branch. In years past an excellent brook trout fishery was enjoyed in the North Branch immediately above Stoughton Pond. Presently, the fishery has declined sharply largely because of stream bank erosion, and the resultant silting of spawning and feeding areas. Flooding in 1969 and 1973 had severe scouring effects on the stream bed and further reduced suitability.

The portion of the North Branch from the Stoughton Dam to the confluence with the Black River exhibits spotty success rates. During warm weather the water temperatures are too high to support trout.

In the Black River running from the outlet works at North Springfield Dam to a point in the original river channel, brown and rainbow trout fishing is good. This local "hotspot" is caused by the cooler waters flowing out of the bottom of the conservation pool creating favorable conditions together with the boulder strewn bottom of the outlet channel which provides hiding and feeding areas. This population appears to be self-sustaining.

Small native populations of brook trout occur in most of the several small streams which enter the reservoir at various points. These can support light fishing.

Aquatic Furbearers

The principal furbearers associated with the aquatic habitat at North Springfield Lake are muskrat (Ondatra zibethica) and beaver (Castor canadensis). An occasional otter (Lutra canadensis) or mink (Mustela vison) may be encountered, but their numbers are small, with only one or two in the entire area because they are predators and are highly territorial. One mink was trapped in 1974.

Currently a beaver colony is active in the low lying area along the main branch of the Black River below the old Perkinsville power dam and adjacent to the Weathersfield town garage. One or two "bank beavers" have been active at scattered spots throughout Stoughton Pond and the lower reservoir.

For a period after construction (1960-62), the conservation pool was raised to 18 feet during the late fall and winter months. This resulted in an increase in habitat suitable for muskrats. The muskrats were able to travel unmolested under the ice out into the flooded field areas and feed on the exposed vegetation. The muskrat population boomed. For two or three years trapping catches ranged 300-400 per season.

The muskrat population rapidly declined partly because of the loss of the flooded fields in fall and partly because of the cyclic nature of their population dynamics. Currently, few muskrats are found in the reservoir because of the lack of suitable habitat. Most are bank dwellers. The reservoir basin received a severe scouring from floods in 1969 and 1973. This which eliminated most of the vegetation and silted in some of the marsh area that the muskrats were dependent upon.

Trapping permits are still issued for North Springfield Lake, but current furbearer populations are not great enough to yield many pelts.

Waterfowl

For the purposes of this management plan, the term waterfowl includes members of the family Anatidae, shorebirds, wading birds and all other species associated with marshland habitat.

North Springfield Lake has about 20 acres of grassy marshland located on the north and east sides of the conservation pool, isolated inlets near the airport, and at the northern end of Stoughton Pond. The North Springfield Reservoir is considered a significant wetland.

North Springfield Lake is currently used by small flocks of migrating waterfowl including: Canada Geese (Branta canadensis), mallards (Anas platyrhynchos), black ducks (Anas rubripes), green-winged teal (Anas carolinensis), American goldeneyes (Bucephala clangula), common mergansers (Mergus merganser), wood duck (Aix sponsa) and several other occasionally visiting species.

During the nesting season a few breeding pairs raise broods. Ten duck nesting boxes were located in the reservoir during the 1975 nesting season. When inspected in January 1976, 3 boxes showed positive evidence of wood duck use. Five boxes showed signs of at least an attempt at nesting by unknown species.

Up to five great blue herons (Ardea herodias) have been observed at one time in the marsh and many other species nest in and feed in the area. Table 8 lists the species which have been sighted in the area.

An excellent stand of terrestrial smartweed (Polygonum sp.) grows at the north and west boundary of the conversation pool and covers about 30 acres adjacent to the Black River on the west side of the reservoir. Smartweed is a favored waterfowl feed. A few local duck hunters enjoy hunting the first migrating flocks at North Springfield Lake. As the birds grow accustomed to the hunters, the success rates drop off fast so that little hunting is done after the first two weeks of the season. The small flocks currently attracted to the lake give only limited sporting potential, but it is important in this area of limited waterfowl hunting opportunities.

Water Quality

In 1966 the Vermont Water Resources Board classified the waters of the Black River. The river and reservoir water is considered class B with the exception of the portion of the river in Ludlow village which is considered class C.

A certain amount of turbidity still occurs at North Springfield Lake and Stoughton Pond, particularly after storms when suspended particulates are brought into the reservoir. Some foaming occurs and unpleasant odors are noticeable during certain times of the year. The numerous bank slumps in the reservoir contribute to reservoir turbidity. An increase in primary productivity resulting from higher water temperatures in the pool also has some effect on turbidity.

During portions of the summers of 1974 and 1975 the recreation area at Stoughton Pond was closed to swimming because of coliform bacteria levels exceeded state health standards. To date, the source of these contaminants is unknown. The town of Weathersfield's sanitary landfill is located in a marsh which drains into the North Branch and may contribute to the problem

Water Quality Surveys

On 19 August 1968 the Vermont Fish and Game Department conducted a lake survey of Stoughton Pond and collected limited water quality data. The North Branch water parameters above the confluence with Stoughton Pond averaged 61°F, temperature pH of 7.4, total hardness of 102.6 ppm, and MO alkalinity of 68.0 ppm. Table 9 lists observations for Stoughton Pond. All data were collected using a Model AL-36-WR, HACH KIT.

On 7 July 1969 a stream survey of the North Branch was conducted. At that time the river averaged 63.5°F, 68.4 ppm total hardness, 75.2 ppm MO alkalanity, and pH of 8.6.

On 7 August 1973 the Vermont Fish and Game Department conductd a lake survey of North Springfield Lake. The data accompanying that report are very brief: MO alkalinity 47.8 ppm, total hardness 85.5 ppm, and pH of 8.9.

The New England Division (NED) Corps of Engineers' Water Quality Laboratory has been collecting data for North Springfield over the last few years. Data are not collected during the winter months and no impoundment samples have been taken in the main pool. Raw data or summaries are available from Project Operations Branch, NED and will be consulted as a regular part of the annual work plan or before the implementation of any management practices to ensure compatibility.

Tables 10 and 11 provide a summary of water quality parameters collected from 1971 to 1974 during the months of March to December.

Project Operations Branch will coordinate a sampling program to monitor water quality in the main conservation pool. This information will prove useful for fisheries management.

Analysis of data collected to date shows that nowhere in the reservoir or its tributaries are conditions extremely adverse. Oxygen content is fairly uniform and conditions are favorable for aquatic organisms. The reservoir as a whole can be considered good and generally hospitable to the aquatic communities presently associated with it. Moreover, the data indicates that water quality has been generally uniform throughout the years during the months when data have been obtained and tabulated.

Reservoir Clearing

Reservoir clearing at North Springfield Lake has been limited to removing isolated clumps of trees throughout the reservoir which have been killed by impoundments and removing trees after bank slumps have occurred. Part of the bottom of Stoughton Pond was cleared before initial impoundment. Most of the reservoir was originally farmland so the bottomland near the river was all in fields. For the most part the original wooded areas are still intact.

Tree mortality from impoundments has been described in the U.S. Army Cold Regions Research and Engineering Laboratory's special report 220, Inundation Damage to Vegetation at Selected New England Flood Control Reservoirs, dated March 1975. However, no clearing for operational maintenance is planned. Those stumps and whole trees which have subsided into the lake, and do not pose a future trash problem, will be left in place to provide cover for fish.

Aquatic Vegetation

At the present time no large amount of aquatic vegetation exists at North Springfield Lake or Stoughton Pond. The main pool is surrounded by a fringe of saw grass, terrestrial smartweed, interspersed with common mullein (Verbascum thapsus) and other weeds and grasses. Very few cattails (Typha species) or other emergent type plants are present and almost no floating or submerged species occur. The same is true for Stoughton Pond with the exception that a small area of emergent vegetation is present at the northeast corner of the pond.

There are various reasons for the lack of vegetation, particularly where the large shallow areas in the main conservation pool would seem to provide nearly ideal conditions for emergents, floating, and submergent vegetation. Foremost is the fluctuation of the pool itself. Emergent and floating vegetation require a constant water level. Their peculiar adaptations dictate that specific portions of the plant be in the water and other specific portions be exposed to the air. Water level fluctuations of a few inches either way for more than a few hours will result in stress and sometimes death. Another reason is the disruption of the substrate resulting from the floods of

1969 and 1973. Both floods caused severe scouring in some areas and significant siltation in other areas thereby disrupting any vegetation which had been established or was just developing.

No problems currently exist from aquatic weeds. During the period in the early 1960's when the 470 feet MSL pool (23 foot pool) was held through the winter, terrestrial smartweed tops became frozen into the ice and were carried down with the debris in the spring, becoming tangled in the debris and the log boom. Since the pool has been maintained at 462 feet MSL (15 foot pool), no problems like this have resulted.

The populations of aquatic plants are far below those levels which would cause fish die-offs, objectionable odors, or any other problems. The overall aquatic community would benefit by an increase in levels of vegetation.

Commercial Fishing

No commercial fishing is conducted at North Springfield Lake. Current populations are sufficient only for moderate sport fishing. Even if populations are increased significantly through management efforts, the fishery would still not be adequate to support commercial efforts.

Water Level Fluctuation

Anytime a body of water is subjected to erratic and uneven changes in water levels, an impact will result. At North Springfield Lake this impact has manifested itself in the failure of some aquatic vegetation, particularly emergents and floating plants, to become established.

The main pool at North Springfield has had 65 changes in water level of 5 feet or more since 1961. Most of these have occurred during the spring or summer when maximum impact on aquatic vegetation would result. As pointed out earlier fluctuations of only a few inches can kill many aquatics. The pool at North Springfield has risen and fallen from one to three feet a large amount of times. Further details on impoundments and drawdowns can be obtained from project records.

Habitat Improvement and Maintenance

To insure that North Springfield Lake continues to provide suitable and productive fish and wildlife habitat, management practices must be applied to improve and maintain the existing habitat. Numerous techniques can be employed to manipulate an ecosystem. Texts such as Wildlife Management Techniques Manual,

Journal of Wildlife Management, (The Wildlife Society, Washington, D.C., 1971) and others should be consulted to provide overall guidance on habitat improvement techniques.

In dealing with aquatic ecosystems three basic life forms are of principle concern. They are aquatic furbearers, waterfowl, and fish. Fish species are further divided into cold water species and warm water species.

A management practice aimed at one principle life form will have some effect on others; therefore, it is necessary to review the effect on all life forms before implementing specific proposals.

Waterfowl and Aquatic Furbearers

Waterfowl at North Springfield Lake would benefit from the following habitat improvement efforts:

The erection and maintenance of a number of artificial nesting cavities both in the main pool and in the pool at Stoughton Pond. A backwater area exists at the upper end of Stoughton where two or three broods of wood ducks could be raised. Another backwater is located near the main dam. Both of these backwater areas and the pool perimeter provide many sites appropriate for the erection of artificial cavities.

The establishment of more aquatic vegetation both in and around the permanent pool concentrating on plant species that are not so greatly affected by changing water levels. An increase, particularly in the amount of emergents and floating vegetation, would greatly enhance the waterfowl potential of North Springfield Lake by providing suitable cover and food. Currently the lake offers a rather sterile environment and consequently does not attract nearly as many puddle ducks as it could. An increase in aquatic vegetation would also benefit fisheries populations by providing additional cover. Aquatic furbearers would also benefit from more vegetation, particularly muskrats which depend on emergents for food and cover.

Warm Water Fishery

The following are management practices aimed at improving the warm water fisheries:

The establishment of aquatic vegetation to provide cover for forage fish and predators, as discussed above under waterfowl management.

The control of erosion and slumping adjacent to the pools and rivers. High silt loads cause turbidity and generally distress fish. Consideration should be given to stabilizing and resloping the more

seriously eroded and slumped areas. Slope stabilization efforts would benefit all fish and aquatic wildlife using North Springfield Lake as well as the downstream watershed.

Providing underwater cover or artificial reefs using inexpensive materials and project personnel to benefit the largemouth bass population. One method would be to sink weighted, dead red pine trees, with branches still attached, in the old river channel and along steep shorelines. Another method would be to use old automobile tires tied togehter with cable and weighted with concrete. Both of these methods will result in more cover available, effectively increasing the number of available niches within the reservoir, and will promote the growth of larger bass.

Cold Water Fishery

Several broad management objectives are possible to improve the cold water fishery habitat at North Springfield. Most of these are structural in nature which deal directly with the fish populations. A discussion of each one follows:

The stabilization and resloping of seriously eroded and slumped areas immediately adjacent to the rivers, Stoughton Pond, and the main pool. The objective is to reduce the silt load and turbidity, to which most cold water fish species are particularly intolerant.

The second is a drawdown of Stoughton Pond to allow dredging of silted-in spawning and feeding areas.

The dredging of the delta formed at the headwaters of the Stoughton Pond by the North Branch. Dredging will improve feeding and spawning habitat as well as improve fisherman access.

The poisoning and reclamation of fish populations at Stoughton Pond. This would be accomplished in conjunction with the drawdown and in cooperation with Vermont Fish and Game Department biologists to remove over-populated rough fish and to restock desired species, such as rainbow trout. Reclamation would be conducted regularly on a 5 year basis depending on population data. This is necessary because the large upstream rough fish population would gradually reinfest the pool. No adverse impact would occur to other species. Stocking is necessary after reclamation because of the shortage of available spawning habitat and the fishing pressure exerted on this highly accessible pond.

Improve the stream habitat in the general reservoir. Specific methods would include stabilizing banks and improving cover where possible. This benefits the stream fishery as well as lake species by producing more individuals and increasing available habitat.

Fisherman Access

The project is surrounded by well maintained state and town roads running the length of the reservoir. Access to Stoughton Pond is available by the recreation area on Stoughton Pond Road off Vermont Route 106 and secondly, boat launching facilities on Stoughton which are a ramp at the end of a town road which connects with Stoughton Pond Road and one at the Crown Point Campground. Additionally, boat launching facilities could be made available at the upper end of Stoughton where the North Branch enters the pond, (if the channel is dredged). This area is accessable from a project road that connects with Vermont Route 131 in Amsden.

The main pool can be reached by foot from numerous points along the dam and from Reservoir Road. The East Access road, a project road, connects with Reservoir Road near the Springfield Sportsmens' Club and provides vehicle access and parking to the area of the confluence of the Black River and the conservation pool. The east snowmobile trail leaves the end of the East Access road and runs the length of the river to the Stoughton Dam. Boat launching facilities on the main pool are reached via Maple Street in Perkinsville off Vermont Route 106. Additional parking and foot access is available from the project roads connecting with Maple Street. The portion of the main branch of the Black River can be reached from the old power dam to the confluence of the two rivers or by taking the Sand Hill Access road, located adjacent to the Weathersfield Town Garage, off Stoughton Pond Road. The tailwater to the Stoughton dam and the stretch of the North Branch to the confluence of the two rivers can also be reached from Sand Hill.

Creel Census

Creel census data for North Springfield Lake is essential in guiding management decisions by showing how the fishery is being used and by supplying additional population data. Creel census information is currently not available from any source. Observations by project personnel indicate the main pool receives light pressure, the rivers receive moderate to light pressure, and Stoughton Pond receives moderate pressure.

Sport Hunting and Trapping

Access for hunting and trapping is the same as fishing. Upon entering the reservoir proper, a different branch road might be selected for upland hunting rather than trout fishing.

Bag check data is necessary for proper management to assess hunting use and determine populations trends. Bag check information is not currently available for either trapping or waterfowl hunting.

For the past several years there have been only four trapping permits issued. Under present conditions this is satisfactory. If populations increase, the number of permits could be appropriately increased.

Permits to place duck blinds on the main pool have been limited to four in the past two years. A few more hunters not using blinds also hunt the area. There is little or no pressure on Stoughton Pond.

The reservoir lands should remain a designated waterfowl hunting area, except for the area near the dam as indicated on the map (Exhibit B).

Endangered and Threatened Species

Endangered or threatened species, and species of special concern will receive special attention and consideration. Many wildlife species and plants are overall indicators of environmental quality and degradation, therefore, it is important to monitor their numbers and health and to preserve them when possible.

North Springfield Lake is frequently visited by osprey (Pandion haliaetus), a threatened species. A nesting platform was erected several years ago in the backwater area near the main dam. However, there is an abundance of suitable trees available. Several tall, dead trees have been left standing in various areas adjacent to the pool to provide a roost for the birds to observe the reservoir. During the summer it is common to see one perched on a dead elm near the old Tolles Hill Dam. The practice of leaving dead trees should be continued for the benefit of other raptors, such as an occasional peregrine falcon (Falco peregrinus), endangered species, red-tailed hawk (Buteo jamaicensis), pigeon hawk (Falco columbarius) threatened species. The common loon (Gavia immer), a species of special concern, occassionally appears in the main pool or Stoughton Pond. Little effort can be made to encourage them except to maintain the conservation pools.

Fishers (Martes pennanti), threatened furbearers, are on the increase in Vermont and frequently pass through the reservoir. Since they are territorial predators little can be done to increase their numbers on an area the size of North Springfield Lake.

Research Needs

The research needs related to the aquatic environment at North Springfield Lake are extensive. Very little actual data is available concerning the benthic community and the primary producers. Yet data is essential to the management of resources. In order to determine population trends and monitor environmental impact of various activities, certain information must be collected and reexamined on a periodic basis.

Foremost is the need for a complete stream and lake survey of the entire reservoir and tributary waters. This includes benthic organisms, plankton, neckton, littoral, profundal, and emergent, floating, and submerged vegetation. Standard limnological methods should be employed to collect these data and analyze them. Additional surveys are needed on a regular basis (5 year intervals) to continue to monitor the ecosystems.

More detailed water quality information is necessary. Impoundment stations in the main conservation pool are needed to monitor DO, temperature, and other factors. Also, data should be collected over 12 months of the year since limiting factors frequently appear during the period of ice cover. Closely associated with the inventory is an on-going study of the impact of pool fluctuation documenting the changes in the aquatic community brought about by the flood control operations.

Also necessary are creel census, and waterfowl hunting bag checks, and trapping harvest counts to determine the rates of harvest. These should be on-going programs.

Other research projects include: investigating the amount of use artificial nesting cavities receive by wood ducks and other species; determining the reproductive success of ground nesting waterfowl, and studying the effects of pesticides used on project lands.

SECTION 4. TERRESTRIAL RESOURCES

General

Management of terrestrial resources at North Springfield Lake will be conducted according to sound ecological principles using all data available, including data obtained from implemented management programs, Vermont Fish and Game personnel, and other sources before new practices are undertaken.

The terrestrial resources at North Springfield are divided between predominantly mixed deciduous forests and former agricultural fields in several stages of succession. A few natural white pine stands occur along with several plantations. Several fields are maintained as open areas by regularly harvesting the hay. The topography varies from flat to very steep with some areas exceeding 40 percent slope. Overall, the project is a typical former agricultural area such as occurs throughout the Connecticut River Valley in Vermont.

Upland Species

Most of the traditional game species found in Vermont come under this category. Following are the species found at North Springfield Lake: ruffed grouse (Bonasa umbellus), snowshoe hare (Lepus americanus), cottontail rabbit (Sylvalagus transitionalis), American woodcock (Philohela minor), raccoon (Procyon lotor), woodchuck (Marmota monax), and the other less important residents of fields and brushy areas such as the meadow vole (Microtus pennsylvanicus) and killdeer (Charadrius vociferus).

Ruffed Grouse

Ruffed grouse occur in various areas throughout the reservoir. The brushy areas on the east side near the old power dam, the area around the "overlook", the top of the hill west of the main dam, and the area below the Stoughton dam provide the best habitat.

Grouse prefer brushy areas, are fond of old apple trees (Pyrus malus), and require the presence of quaking aspen (Populus tremuloides) trees. Studies have shown that the male grouse always locates his drumming site within 30 feet of a quaking aspen. The aspen bud is an important item in the diet of the grouse, particularly during the winter months when up to 90 percent of the diet is made up of aspen buds. Coniferous stands are also important to grouse as the trees provide roosting cover both in summer and winter.

Grouse are cyclic, exhibiting extreme population fluctuations. Typically the grouse cycle averages about 10 years with the high points occurring every 10 years. The cause of these high and low cycles in grouse populations is not understood at the present. Although many theories have been proposed, none are completely satisfactory.

Cottontail Rabbit

Cottontail rabbits are found in the woods around North Springfield Lake. They are predominantly grazers depending mostly on forbs and grasses. They thrive on abandoned orchards and fields which provide herbaceous plants for food and brush for cover. Cottontails will often take over an old woodchuck burrow, but they do not dig their own. Presently cottontails are very few in number and are of special concern. Their numbers have diminished as a result of land growing beyond successional stages needed for their survival.

American Woodcock

American woodcock are migratory and have many odd and interesting habits, and rigid habitat requirements. The woodcock is actually a displaced shorebird being more closely related to the snipe and sandpipers than the ruffed grouse with whom it shares some habitat.

Woodcock males arrive in early spring and stake out their singing fields. These can be any opening, but are usually abandoned agricultural fields supporting Spirea, white pine (Pinus strobus) and grey birch (Betula populifolia).

The eggs are laid directly on the ground in early successional hardwood stands, particularly birch and aspen stands. The clutch is small averaging 2-4. The young are raised and migrate in the fall.

The most interesting aspect of woodcock behavior is their diurnal cycle. Woodcock spend the day feeding in alder (Alnus rugosa) thickets and sometimes aspen stands where they probe with their long bill, which is hinged in the middle, for earthworms (Lumbricus spp.). Earthworms compose about 90 percent of their diet. Alders have nitrogen fixing bacteria in nodules on the roots, which the earthworms thrive on, and which explains why woodcock have a preference for alders. At dusk, the woodcock fly or walk out into hawkweed (Hieracium species) and Spirea to roost on the ground and sleep, often directly in the open. Then just before sunrise they fly or walk back into the alders and feed during the day. The key to managing woodcock is the availability of suitable alder thickets and "summer fields".

At North Springfield, a few woodcock can usually be found around the dryer edges of the alders near the old power dam on the Black

River. However, this stand is a marginal habitat because of the standing water in some areas causing it to be too wet for worms. A suitable summer field is located adjacent to the thicket.

The heart of the woodcock breeding range is located farther north in Maine and New Brunswick where conditions are right for vast stands of alders.

The population levels at North Springfield Lake will probably never increase significantly, but some efforts to improve the existing habitat for woodcock are justifiable.

Other Species

Raccoon, woodchuck, songbirds and the non-game species, as well as other inhabitants of the upland community are present at North Springfield Lake. Their many different habitat requirements are too numerous and too complex for specific treatment. Many of their requirements overlap with the result that, for the bulk of upland wildlife, diversity in the environment is the primary consideration. Diversity in cover, food and neighbors is essential. The more diverse the upland community, the more stable and prolific its wildlife.

Forest Species

This category includes habitat requirements for whitetail deer (Odocoileus virginianus), black bear (Euarctos americanus), snowshoe hare, and the full time forest dwellers, such as gray (Sciurus carolinensis) and red squirrels (Tamiasciurus hudsonicus) and non-game species such as the warblers.

Whitetail Deer

The whitetail deer lives on the borderline between upland and forest land. They seek much of their food in meadows and brushy areas, particularly in spring and summer, and seek cover in the forest. Deer require coniferous stands, preferably located on west or south slopes, for wintering areas. The dense canopy combined with exposure to the southern winter sun makes for lesser snow depths. Wind velocities have also been found to be significantly reduced in these areas.

During hard winters deer populations may be confined to a "yard". When snow depths reach 18 inches, movement for the deer becomes highly stressed. This requires more energy input than can be obtained from available food. Deer have adapted to these winter conditions by concentrating in areas (deer yards which provide all or most of their needs. The group forms trails within these areas, thus conserving the net energy loss. A problem in Vermont for wintering deer is a low deer harvest each year caused by the bucks only law. A population has developed which is beyond the carrying capacity of the land, resulting

in malnutrition, low fertility, smaller deer and fewer legal bucks. A situation which compounds the problem by carrying more deer into the next winter. The problem is especially severe during winters of long duration and heavy snows when deer must yard. Massive die-offs result, and the habitat is damaged by overbrowsing. Populations should be greatly reduced for a longer period of time to allow habitat recovery. Therefore, a regular controlled harvest of antlerless deer as well as bucks is recommended. An improved information-education program should be carried out to educate the public on the need for scientific management of wildlife resources.

Two significant deer wintering areas within the project bound. These areas are shown on the map (Exhibit B). During easier winters, deer maintain travelling patterns throughout the reservoir, particularly between the area east of the Black River and the areas adjacent to the airport and Maple Street in Perkinsville. The area east of the Black River continues to the top of the ridge off project lands.

Intermittent clearcuts of one to one and one half acres in size will promote stump sprouting and herbaceous growth. This browse is an available food source for deer.

Black Bear

Black bear are wide ranging omnivores which utilize many different biotic communities. Home ranges frequently are 30 - 40 square miles in size. Bear are dependent on the forest for cover and some food during fall and winter. Mast is an important food during fall and berries, small mammals, and carrion are important in spring and summer. Bears hibernate during the winter and usually choose secluded forest caves or old hollow logs for this purpose. North Springfield Lake is within the home range of one or two bears, but the project area is not of sufficient size to be a significant habitat component.

Snowshoe Hare

Snowshoe hare frequent coniferous stands and wooded swamps. Hare are browsers by nature, but will supplement their diet with grasses and forbs. In winter months hare can seriously compete with deer for the small amounts of available browse which they both need.

Snowshoe hare population is cyclic, following a similar 10 year cycle as grouse, but the peaks and valleys of population fluctuations do not fall in the same years. It is not known if the cycles are related in any way.

Areas at North Springfield Lake that are favorable to snowshoe hare include the confierous woods and the brushy regions bordering fields.

Gray and Red Squirrels

Gray and red squirrels are primarily forest dwellers depending on mast almost completely for their diets. Both squirrels will supplement their diet with fungi, bird eggs and insects. Grays are found more closely associated with oak (Quercus species) and beech (Fagus grandifolia) stands, while reds will frequent conifers.

All the softwood stands at North Springfield are heavily populated with red squirrels. The grays occur in fewer numbers because of the lack of extensive oak stands; however, a few grays can be found along with the reds in the conifers and throughout the reservoir in the hardwood stands.

Non-Game Species

Numerous non-game species of songbirds and birds of prey occur in and around the reservoir. Most common are warblers, sparrows, hawks and owls. Many species of non-game mammals frequent the woods. Most all of these species are normal inhabitants of the forest and field ecosystems. Little is needed or necessary to encourage them, as long as good habitat maintenance practices are followed.

Land Management Effects

Land management practices at North Springfield Lake have a greater impact on the wildlife resources than any other factor. By modifying the character of the land, the habitat on which wildlife depends is altered. To date, the land management practices followed at North Springfield Lake have been beneficial to wildlife. For a period after construction, heavy emphasis was placed on reforestation which if ignored could have resulted in a decline in diversity of habitat.

In 1973 the summer flood killed many of the red pines (Pinus resinosa) planted throughout the reservoir. This caused many planting sites to revert to open fields.

Currently, Vermont is approximately 75 percent forested. Most wildlife depend on openings and the ecotone between forests and fields. With the extensive woodlands at North Springfield, it is important to maintain fields and forest openings to increase the diversity of habitat types for wildlife.

Mature conifer stands are essential for wintering whitetail deer. Other forest wildlife species are dependent on various stages of forest succession. In managing the forest resources at North Springfield, it is essential that conifer stands, especially those occurring on south and west facing slopes, be preserved. Timber cutting should be minimized in these areas. Any timber cutting should be conducted to

encourage the regeneration of coniferous species and perpetuate wintering areas. Throughout other areas unevenaged timber management will ensure a diversity of age classes and provide habitat requirements for a greater variety of wildlife species.

All timber management practices must be coordinated with the Vermont Fish and Game Department. Land management activities must be coordinated considering all areas of fish and wildlife management to recognize their impact on wildlife resources. These considerations range from the date that fields are mowed to the placement of a new recreation facility. Activities such as pesticide use and timber harvesting on steep slopes, must be given careful consideration before implementation.

Adequacy of Lands Allocated to Wildlife

At North Springfield, the lands remaining in a natural state are adequate for the use and propagation of wildlife. Areas developed for recreation and project maintenance comprise a small percentage of the total area.

Habitat Improvement and Maintenance

The terrestrial resources at North Springfield Lake can be enhanced and improved. Maintenance of habitat presently in a productive state is of prime importance. Several important management objectives for wildlife at North Springfield Lake are discussed below.

Because 75 percent of Vermont is now wooded, and this percentage is increasing, the need to maintain and increase open areas is pressing. Wildlife benefit from these openings which provide forbs and grasses for their use, and from the ecotone community which exists between the borders of fields and woods. Many species of wildlife, including most game species, are found in the ecotone community between woods and fields and may disappear if openings are eliminated. Many fields are currently leased for hay cutting. Fields not under lease as of 1978 will not be leased but will be maintained by brushing out, and flail mowing every 3-7 years as recommended by the Park Ranger or Resource Manager.

Maintenance of deer wintering areas is extremely important. The exact conditions which make up a suitable deer wintering area are not completely understood; however, whitetail deer need wintering areas to survive Vermont's severe winter conditions. Any timber harvests conducted on west or south facing slopes should be made so that coniferous regeneration is encouraged. The long range goal is the development of dense coniferous stands which could be suitable as future deer wintering areas. Along with the preservation of wintering

areas, the possibility of public acquisition of additional lands outside project boundaries to enclose the entire wintering area located in the vicinity of Reservoir Road, should be explored. It is desirable to have these areas as a public resource and in public ownership. This would insure that this area could not be developed in a manner to disrupt this wildlife habitat.

Many old apple trees are spread throughout the reservoir and are an important food source for deer, bear, ruffed grouse, squirrels, and others. Efforts should be made to release and maintain these apple trees by removing overtopping trees. In addition, apple trees should be planted in appropriate areas such as old fields or erosion restoration areas.

Quaking aspen, an important tree species to deer and ruffed grouse, should be encouraged by cutting back existing stands to stimulate growth of new aspen shoots. Old growth aspen stands should be harvested and the ground scarified to stimulate root sprouting, thus increasing the number of shoots and twigs per acre.

The establishment of food plots in field areas both adjacent to wooded areas and near the pool will benefit many species, including waterfowl and upland game. Crops such as corn, rye, and barley planted with apples, autumn olive (Elaeagnus umbellata), and multiflora rose (Rosa multiflora) should be planted on the borders of fields, on resloped or eroding areas, and in clumps or lines in the centers of large open areas.

The New England cottontail is a species of special concern and deserves special treatment. Cottontails prefer to stay close to cover. A very simple effective management technique for cottontails is the placement of brush piles around the edges of fields and in forest openings. These piles are readily used as concealment and shelter from the weather. Cottontails have many enemies, and need some predator-proof cover for survival. Piles should be about 10 feet wide by 4 feet high and loosely piled. One end may be propped up on a log or rock. Numerous other species such as deer mice, Microtus species, grouse, and many small songbirds in particular use these piles as escape cover from predators.

Agency Coordination

Coordination with the Vermont Fish and Game Department will be actively maintained. Copies of this plan will be forwarded to them and they will be consulted at all stages of plan implementation.

Sport Hunting and Trapping

North Springfield receives moderate hunting pressure during the upland game season and light pressure during rifle deer season. It

is surrounded by areas which are suitable for hunting, including extensive state-owned lands. The only trapping conducted is for muskrats and is insignificant. Access is excellent and is described in Section 3 in the paragraph entitled "Fisherman Access."

Designation of hunting areas parallel that described under aquatic resources. The only addition to this restriction would be the "overlook" area on the East Access. The Ascutney Mountain Audubon Society leases the area for nature interpretation through the fall migration period without user conflicts resulting. Safety Zone hunting posters permitted under state law will be posted in the project administration area to insure that no hunting occurs. The rest of the project will remain open to sport hunting and trapping. The No Hunting Zone is shown on the map at Exhibit B.

Currently no hunter bag check information is available for the reservoir. Bag check data is needed to obtain information on hunting pressure and harvest rates for the process of making sound management decisions.

Endangered and Threatened Species

The New England cottontail, a species of special concern, is dwindling in numbers as more and more of its habitat grows to climax type forests. Maintaining open areas to provide diversity and providing brush piles for cover will encourage cottontails at North Springfield Lake to multiply.

The Indiana bat is the only other endangered species which might be found at North Springfield Lake; however, other than protecting this species when found, little can be done to encourage their numbers.

SECTION 5. ECOLOGICAL RELATIONSHIPS AND IMPACTS

The implementation of this plan will alter some areas of habitat in and around the main lake and Stoughton Pond. The main thrust of the plan is to provide diversity of habitat and natural flora and fauna which can be sustained by the project. The aim is not to encourage large numbers of specific animals, but rather to provide a varied and natural wildlife community in balance with the habitat. Before any major alterations of habitat or major management changes are made, an assessment will be made to insure the desired objective will benefit the environment.

SECTION 6. SPECIFIC SHORT-RANGE AND LONG-RANGE MANAGEMENT PROGRAMS FOR FISH AND WILDLIFE MANAGEMENT

Specific management programs were discussed in detail under the paragraphs entitled "Habitat Improvement and Maintenance" in Sections 3 and 4 above. Those programs, as outlined below, are classified here as being short or long-range programs.

Primary Short-Range:

- Stabilization of severe slumps adjacent to the rivers and permanent pool. This has also been discussed in Appendix B to this Master Plan.
- Protection and maintenance of whitetail deer wintering areas.
- Maintenance of fields and open areas.

Secondary Short-Range:

- Erection of additional wood duck nesting boxes.
- Establish underwater cover for largemouth bass in the main pool.
- Release and periodically prune apple trees.
- Perpetuate and improve quaking aspen stands for ruffed grouse.
- Establish food plots and shrub plantings.

Tertiary Short-Range:

- Establish additional aquatic vegetation in the main pool.
- Improve stream habitat throughout the reservoir.
- Reclamation of Stoughton Pond on a periodic basis.
- Dredge the upper boat ramp area at Stoughton Pond.

Long-Range:

- Manipulation of suitable forest stands to form alternate whitetail deer wintering areas.
- Maintenance of habitat diversity to provide for varied flora and fauna.
- Monitor the environment for adverse effects and continue to evaluate their impact upon the natural resources of the area.

SECTION 7. PERSONNEL AND FUNDING REQUIREMENTS FOR IMPLEMENTATION OF THIS PLAN

Contract to stabilize the slump at the confluence of the Black River and North Branch (1980). approx. $100,000

Contract to stabilize eroded banks on feeder streams - Reservoir Brook, North Branch, and Snide Brook. approx. $ 10,000

Contract to dredge silted-in boat ramp and spawning areas at the inflow of Stoughton Pond (Maybe sell as fill). approx. $ 10,000

Plant three acres of corn for wildlife food plots, plant in small patches on tracts B-201, B-202, B-203-1, C-326, C-301 and C-303.

Rent equipment and perform work with project personnel.

Plow with tractor - 2 hours at $20.00/hr.	=	$ 40.00
Fertilize about 3/4 ton at $110/ton	=	80.00
Plus Tractor	=	40.00
Lime 2 tons/acre at $35/ton	=	210.00
Plus Tractor	=	40.00
Seed 12 lbs./acre rye at $2/lbs.	=	72.00
Plus Tractor	=	40.00
Disc 2 hours with tractor	=	40.00
		$562.00

Release and prune all apple trees with project personnel and equipment.

1	GS-07 Park Ranger for 2 weeks	=	$1,013.00
1	GS-04 Forestry Tech for 2 weeks	=	833.00
1	P/U at $25/day for 2 weeks	=	250.00
1	Chainsaw at $10/day for 2 weeks	=	100.00
			$2,196.00

Placement and maintenance of wood duck boxes using project personnel.

1	GS-07 Park Ranger for 6 days	=	$607.00
1	GS-04 Bio Aide (WL) for 3 days	=	250.00
1	Snowmobile for 6 days at $10/day	=	60.00
			$917.00

Placement of bass reefs or cover with project personnel and equipment.

1	GS-07 Park Ranger for 3 days	=	$305.00
1	GS-04 Bio Aide (WL) for 3 days	=	250.00
1	Outboard and boat for 1 day at $10/day	=	10.00
	cement and cable		50.00
			$615.00

Fields will be maintained by sale of hay leases at no cost to the government - fields where hay is not sold will be cut by project personnel.

1	WB-05 for 2 weeks	=	$832.00
1	Tractor (project owned) at $25/day	=	250.00
			$1,082.00

Remove undesirable tree species from alder stands and stimulate aspen regeneration with project personnel equipment.

1	GS-07 Park Ranger for 2 weeks	=	$1,012.00
1	GS-04 Forestry Tech for 2 weeks	=	832.00
1	GS-04 Bio Aide (WL) for 2 weeks	=	832.00
1	Chainsaw at $10/day for 2 weeks	=	100.00
1	P/U at $25/day for 2 weeks	=	832.00
			$3,026.00

SECTION 8. AGRICULTURAL AND GRAZING PERMITS AND OUTGRANTS

Agricultural leases to harvest hay should be continued at North Springfield Lake. Grazing permits should not be considered because much of the area is close to the water and the fields are actively used for dispersed recreation.

The only outgrants which should be considered are the East Access Overlook area for the Ascutney Mountain Audubon Society to use for nature interpretation and areas to scouting activities.

The reservoir is too small for commercial outgrants, and it would be adversely affected by such attempts. It is best suited for wildlife management and dispersed recreation.

SECTION 9. ANIMAL DISEASES, POLLUTION, AND OTHER ADVERSE EFFECTS

Presently no specific information is available regarding animal diseases, plant diseases, or pollution. Monitoring for these effects will be incorporated into the annual work plan; although indications are that little disease is present. Pollution is not a serious factor.

A serious adverse impact on the environment occurs from the overpopulation of whitetail deer. The population is sufficiently over the carrying capacity of the habitat to cause serious damage. The population must be reduced and brought back in line with the habitat. Once levels are reduced, the habitat will slowly recover to its full carrying capacity. The overpopulation and subsequent malnutrition in conjunction with free-ranging dogs at North Springfield Lake constitutes a significant decimating factor. NED will cooperate with Vermont Fish and Game Department in educating the public to the need for an adequate deer harvest and the need to control free-ranging dogs.

The town of Springfield, Vermont, is conducting a feasibility study concerning hydroelectric power development using the Black River both up and downstream of North Springfield Lake. The study calls for utilizing a portion of the Corps of Engineers' project. This will adversely affect the fish and wildlife resources at this reservoir. As this project proceeds toward implementation, further study should be considered to determine the consequences it will have upon the natural resources of the reservoir area.

SECTION 10. INFORMATION-EDUCATION

Information and education are important aspects of the fish and wildlife management program. The Corps of Engineers is a public agency, and it is imperative that the public be informed of management decisions and programs. Efforts will be made to publicize programs and actions, such as timber cuts or erosion abatement.

Education efforts will be directed at explaining the purposes behind management and to broaden the general public's understanding of ecological relationships. All possible assistance will be given to the development and operation of the proposed nature interpretation center to be set up by the Ascutney Mountain Audubon Society. All possible assistance will be given to the Vermont Fish and Game Department in their efforts to improve public understanding of the whitetail deer management program.

The image and understanding of the Corps recreation-resources management program can only be enhanced by public contacts initiated through an organized public relations program.

SECTION 11. LAW ENFORCEMENT

On Corps of Engineers' flood control projects, the government reserves only proprietary jurisdiction; therefore, all state and local game laws are applicable. All fish and wildlife harvests conducted at North Springfield Lake must be carried out under state law. Corps personnel are not responsible for directly enforcing the law; however, they will cooperate with State and Federal enforcement agencies.

SECTION 12. ANNUAL WORK PLAN

Annual work plans will be developed in detail and maintained by project personnel. Plans will be developed for a five year period and updated annually. Work plans will be consistent with the overall management objectives for the project, acceptable Corps of Engineer practices, and available funds.

EXHIBIT A. TABLES

TABLE 1

Summary of August 1973, Trapnet and Gillnet Sample of North Springfield Lake

Species Taken	No.	Lbs.	% of Total Lbs.
Suckers (Longnose & White) (*Catostomus catostomus* and *commersoni*)	—*	72.8	54.7
Brown Bullhead (*Ictalurus nebulosus*)	384	35.1	26.4
Golden Shiner (*Notemigonus crysoleucas*)	316	21.2	15.9
Pumpkin Seed (*Lepomis gibbosus*)	11	0.9	.67
Yellow Perch (*Perca flavescens*)	3	0.3	.22
Largemouth Bass (*Micropterus salmoides*)	3	2.42	1.82
Rainbow Trout (*Salmo gairdneri*)	1	0.3	.22

*Total number in sample unknown.

Scientific Nomenclature After *Freshwater Fishes of New Hampshire* by John F. Scarola, New Hampshire Fish and Game Department, 1973.

TABLE 2

Number, Species, and Weight of Fish Collected from Northeast Cove of North Springfield Lake, June 12, 1974

Species	No.	Lbs.	% Total	% Total Weight
Golden Shiner	23	0.54	17.0	3.3
Common Shiner (Notropis cornutus)	23	0.32	17.0	1.9
White Sucker	9	4.90	6.7	29.9
Longnose Sucker	1	0.20	0.7	1.2
Brown Bullhead	34	1.88	25.2	11.5
Rock Bass (Ambloplites rupestris)	3	0.27	2.2	1.6
Pumpkinseed	30	1.30	22.2	7.9
Largemouth Bass	8(1)	6.36	5.9	38.8
Yellow Perch	4	0.64	3.0	3.9

(1) Total largemouth bass sample not included, 55 others were caught, mostly in an isolated inlet near dam, adjacent to airport.

Scientific Nomenclature After Freshwater Fishes of New Hampshire by John F. Scarola, New Hampshire Fish and Game Department, 1973.

TABLE 3

Average Length, Weight, and Condition Factors of Largemouth Bass by Age Class Sampled in North Springfield Lake on June 12, 1974

	Age Class		
	I+	II+*	III+
Average TL (inches)	6.0	0	12.3 (11.0-14.2)
Average Weight	0.09	0	1.02 (0.73-1.78)
Average Condition	42.87	0	53.46 (40.07-62.18)
Number in Sample	1	0	62

*No II+ fish were captured in this sample.

TABLE 4

Average Length, Weight, and Condition Factor of Largemouth Bass by Age Class Taken on September 5, 1974

Age Class	0+	I+	II+*	III+
Average TL (Inches)	2.1 (1.7-2.9)	8.9	0	13.7 (13.1-14.3)
Average Weight	2.2 (grams)	0.42	0	1.50 (1.16-2.14)
Average Condition	____	59.58	0	59.38 (49.46-73.18)
Number in Sample	56	1	0	6

*No II+ fish were captured in this sample.

TABLE 5

Number, Species, and Pounds of Fish Collected From the Northeast Cove of North Springfield Lake, June 12, 1974 and May 23, 1975

Species	No.*		Lbs.		% Total No.		% Total Lbs.	
	74	75	74	75	74	75	74	75
Golden shiner	23	4	0.54	0.16	17.0	3.3	3.3	0.1
Common Shiner	23	0	0.32	0.00	17.0	0.0	1.9	0.0
Spottail Shiner (Notropis hudsonius)	0	15	0.00	0.07	0.0	12.4	0.0	0.4
White Sucker	9	28	4.90	7.30	6.7	23.1	29.9	44.5
Longnose Sucker	1	0	0.20	0.00	0.7	0.0	1.2	0.0
Brown Bullhead	34	62	1.88	3.06	25.2	51.2	11.5	18.7
Rock Bass	3	0	0.27	0.00	2.2	0.0	1.6	0.0
Pumpkinseed	30	7	1.30	0.52	22.2	5.8	7.9	3.2
Largemouth Bass	8	4	6.36	5.28	5.9	3.3	38.8	32.2
Yellow Perch	4	1	0.64	0.01	3.0	0.8	3.9	0.1

*Zero entries represent no individuals captured.

Scientific nomenclature after Freshwater Fishes of New Hampshire, by John F. Scarola, New Hampshire Fish and Game Department, 1973.

TABLE 6

Average Length, Weight, and Condition Factor of Largemouth Bass Taken in North Springfield Lake 1974 & 1975

	1974	1975
Average TL (inches) and Range	12.3 (11.0-14.2)	13.7 (12.4-15.6)
Average Weight Lbs. and Range	1.02 (0.73-1.78)	1.51 (1.03-2.44)
Average Condition Factor and Range	53.46 (40.07-62.18)	57.34 (52.08-65.90)
Number in Sample	63	47

TABLE 7

Average Weight, Length and Relative Abundance of Fish Taken by Trapnet and Gillnet, Stoughton Pond, August 19-23, 1968

Species	No.	Average Length Inches	Average Weight Pounds	% of Total Catch	% of Total Weight
Brown Trout	4	7.4	0.20	0.6	0.8
Golden Shiner	324	5.7	0.08	46.3	24.6
Creek Chub (Semotilus atromaculatus)	2	4.3	___*	0.3	___*
Longnose Sucker	158	7.7	0.16	22.6	24.1
White Sucker	127	8.6	0.30	18.1	36.2
Brown Bullhead	13	6.7	0.25	1.8	3.1
Pumpkinseed	38	4.0	0.12	5.4	4.4
Yellow Perch	34	5.7	0.21	4.9	6.8

*This species not weighed.

Scientific nomenclature after Freshwater Fishes of New Hampshire by John F. Scanola, New Hampshire Fish and Game Department, 1973.

TABLE 8

Waterfowl Species Sighted on North Springfield Lake

Common Loon (Gavia immer)	Common Mallard (Anas platyrhynchos)	American Goldeneye (Bucephala clangula)
Pied Billed Grebe (Podilymbus podiceps)	Black Duck (Anas rubripes)	Bufflehead (Bucephala albeola)
Great Blue Heron (Ardea herodias)	Pintail (Anas acuta)	American Merganser (Mergus merganser)
Green Heron (Butorides virescens)	Green-winged Teal (Anas carolinensis)	Marsh Hawk (Circus cyaneus)
American Bittern (Botaurus lentiginosus)	Blue-winged Teal (Anas discors)	Osprey (Pandion haliaetus)
Canada Goose (Branta canadensis)	Wood Duck (Aix sponsa)	Peregrine Falcon (Falco peregrinus)
Snow Goose (Chen hyperborea)	Ring-necked Duck (Aythya collaris)	Common Gallinule (Gallinula chloropus)
Spotted Sandpiper (Actitis macularia)	Solitary Sandpiper (Tringa solitaria)	Lessor Yellow-legs (Totanus flavipes)
Belted Kingfisher (Megaceryle alcyon)	Red-winged Blackbird (Agelaius phoeniceus)	Herring Gull (Larus argentatus)

Sighted by Elanor Ellis, N. Springfield, Vt., Scientific Nomenclature after A Guide to Field Idenfification - Birds of North America by Chandler S. Robbins, Bertel Bruun, and Herbert S. Zim, Golden Press, New York, 1966.

TABLE 9

Water Quality Data for Stoughton Pond on 19 August 1978

Depth in Feet	Temperature (°F)	Dissolved Oxygen	CO_2	PH	MO Alkalinity (ppm)
Surface	71.0	10.5	7.0	7.8	58.0
5	69.0	9.5	7.0	7.5	68.4
10	68.0	8.0	10.0	7.5	68.4
12	67.0	7.5	*	*	*
15	65.0	1.5	15.0	6.8	68.4
20	61.0	0.0	15.0	6.8	60.4

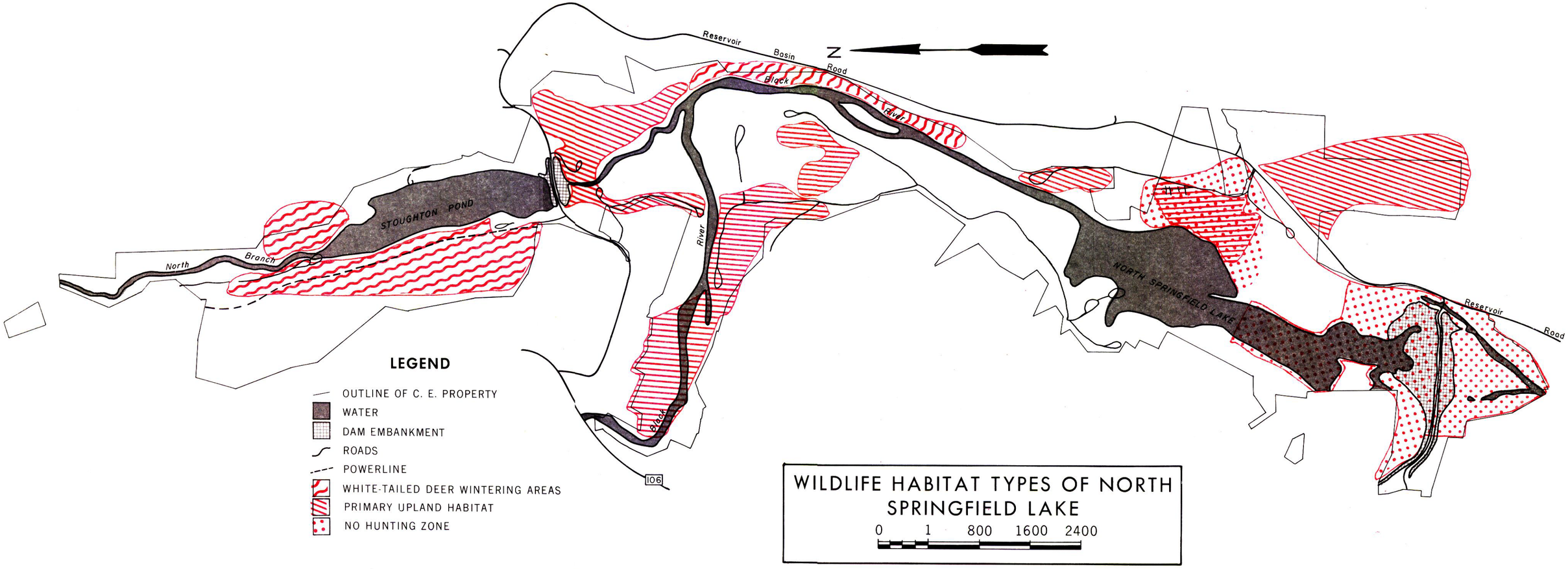
*Figures were not available.

TABLE 10
Summary of Water Quality Parameters for North Springfield Lake
During March Through December, 1971-1974

Sampling Point	Temperature (°F)	Conductivity (Micro-OHMS)	D.O. (Mg/L)	% D.O. Saturation	pH	Total Coliform Bacteria (Individuals/100ML)	Fecal Coliform Bacteria (Individuals/100ML)	Total Hardness (MG/L)	Turbidity (J.T.U.)
Discharge Main Dam	61	112.6	10.3	96.7	7.0	1264	12.7	23.8	7.7
Black River RT. 106 in Perkinsville	59.9	111.2	10	96	7.3	*	*	31.5	3.6
Stoughton Pond Beach	71.7	147.6	8	91	7.4	565	22	29	6.4
North Branch at RT. 131 Bridge, Amsden	57	141.8	9.7	90	*	*	*	42.5	2.7

*No data available

EXHIBIT B. MAP OF FISH AND WILDLIFE AREAS AT NORTH SPRINGFIELD LAKE


Reservoir
Basin
Road
N
Black
River
STOUGHTON POND
North
Branch
River
NORTH SPRINGFIELD LAKE
Reservoir
Road
106
LEGEND
OUTLINE OF C. E. PROPERTY
WATER
DAM EMBANKMENT
ROADS
POWERLINE
WHITE-TAILED DEER WINTERING AREAS
PRIMARY UPLAND HABITAT
NO HUNTING ZONE
WILDLIFE HABITAT TYPES OF NORTH SPRINGFIELD LAKE
0 1 800 1600 2400